

Report Date: December 1 2009  
Contact: Dave Ramslie  
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RTS No.: 8489  
VanRIMS No.: 08-2000-20  
Meeting Date: December 1, 2009

TO: Standing Committee on Planning and Environment  
FROM: The Manager of Sustainability in consultation with Chief Building Official  
SUBJECT: Solar Homes Strategy

**RECOMMENDATION**

- A. THAT the City of Vancouver becomes a SolarBC Solar Community
- B. THAT the City administer a solar hot water incentive program in cooperation with SolarBC and Terasen Gas beginning January 1<sup>st</sup> 2010 for a minimum of one year or 50 homes
- C. THAT the City of Vancouver provide incentive funding in cooperation with partners to finance up to 50% of the costs of the installation of solar hot water systems on new homes
- D. THAT the City provide training, information, resources and outreach in partnership with industry to increase knowledge and awareness of solar hot water technology

**CITY MANAGER'S COMMENTS**

Developing capacity for solar hot water technology, as outlined by the Mayor's Greenest City Action Team Quick Start Report, is an essential first step for encouraging the adoption of renewable energy and the creation of "green jobs" in Vancouver. The recommendations of this report advance a number of important Council policy directions and demonstrates Corporate leadership with a signature solar hot water project at City Hall.

**COUNCIL POLICY**

In March 2005, Council approved the Community Climate Change Action Plan to reduce greenhouse gas (GHG) emissions in the community to 6% below 1990 levels by 2012.

In March 2007, Council passed a motion directing staff to begin planning for significant, long-range GHG reductions with the eventual goal of becoming a carbon-neutral city.

In July 2007, Council adopted targets to reduce community GHG emissions to 33% below current levels by 2020 and 80% below 1990 levels by 2050. In addition, Council adopted the target of having all new construction in Vancouver be GHG neutral by 2030.

In September 2007, Council adopted a target to reduce GHG emissions by 33% below 1990 levels by 2020.

In June 2008, Council approved the Green Homes Program, which is a world class green building code that addresses energy and water efficiency issues for one- and two-family homes. The Program also includes requirements that all new homes will be pre-piped for solar technology thereby reducing the incremental cost of installing solar systems.

In April 2009, Council received the Mayor's Greenest City Action Team's Quick Starts Report, which recommended early actions the City can take to help Vancouver become the greenest city by 2020. Creation of green jobs and promoting solar hot water were identified as early actions. Council approved a motion directing staff to report back with an implementation plan for the recommended actions.

## **SUMMARY**

The recommendations in this report build on Vancouver's progressive 'solar ready' regulation to support the uptake of solar technology by providing education and outreach on the installation of solar technology. Staff are also recommending incentives for the installation of solar hot-water systems in new homes in partnership with SolarBC, Terasen Gas and Offsetters. These incentives will promote the growth of the local solar industry while providing staff and partners with a unique opportunity to study the effectiveness of solar technology in our environment.

## **PURPOSE**

The purpose of this report is to recommend a solar hot water training and installation pilot program to support the development of the necessary skills, awareness and economies of scale to affect market transformation for solar technology in the Vancouver home building market.

## **BACKGROUND**

In November 2005, Council approved the Green Building Strategy (GBS) to develop specific zoning guidelines and by-laws to enhance the environmental and human health performance of Part 3 buildings (generally over 3 storeys or greater than 600 square metres in building area). In May 2007, Council received an update report on the progress of the Green Building Strategy in which staff presented the refined strategy and conveyed industry support for the program as it now stood. Council instructed staff to develop options and recommendations for future scope, approach, staffing and resources for broadening Vancouver's green building and infrastructure strategy, including expanding the GBS to include buildings that are not classified as Part 3 in the Building By-law.

In June 2008, Council approved the Green Homes Program, which set a number of energy efficiency requirements for new homes. One of the requirements of the Green Homes Program is the provision of mandatory pre-piping for roof mounted solar hot water:

**12.2.2.9. Vertical Service Shaft**

1) A vertical service shaft shall extend from the service room, which contains the service water heater, to the attic space, consisting of at least two 50 mm PVC pipes, capped at both ends, and having at least a 20° angle.

In February 2009, Mayor Gregor Robertson established the Greenest City Action Team (GCAT). GCAT recommended a number of targets by which Vancouver will earn the title of Greenest City by 2020. Two of the GCAT Quick Start Recommendations were to initiate a solar thermal hot water pilot project and to implement a green jobs pilot.

In October 2009, GCAT released a 10 year Action Plan calling for a 20% GHG emission reduction in existing buildings by 2020, and carbon neutral new buildings by 2020. The GCAT Action Plan states "These green building innovations will create thousands of new jobs, create a significant economic stimulus, increase the value of buildings, reduce property owners' operating costs, help Vancouver become more resilient to climate change and energy price fluctuations, and position Vancouver as a global leader in green building technologies and expertise."

To date, the City of Vancouver's approach to encouraging green building and energy reduction measures has been to mandate these practices by way of policies and regulations. This proposed incentive program complements the regulatory approach, by offering tools to facilitate uptake of renewable energy measures and by working with industry partners SolarBC and Terasen Gas to build industry capacity to deliver on these renewable energy technologies.

**DISCUSSION**

**The Development of an Aggressive Solar Energy Incentive:**

The proposed pilot has three components: (1) homeowner education, awareness and incentive (up to 50% of system cost) funded in partnership by SolarBC, Terasen Gas, Offsetters and the City of Vancouver; (2) industry training and support for installations; (3) solar hot water system performance monitoring.

Solar hot water is a technologically and economically viable form of renewable energy in Vancouver's climate. While the technology is well-suited to our climate, there is a lack of familiarity with the technology. According to SolarBC, hot water demands the second largest amount of energy in our homes (after space heating), and it represents about 25-30 per cent of total energy use in our homes. Solar hot water systems generate energy to meet about 60 per cent of a home's hot water heating demand, saving the homeowner money and reducing consumption and reliance on natural gas or electricity. This pilot focuses on new one and two family homes in order to complement the 'solar-ready' requirement of the Green Homes Program.

For this project staff are recommending that the City of Vancouver, in partnership with SolarBC and Terasen Gas, pilot incentives for the installation of 50 solar hot-water systems in new home construction. Staff are proposing this for new construction in order to support our Green Homes Program requirement for pre-piping for solar hot-water. New construction is also the best opportunity to ensure that solar systems are installed with the most opportunity for success. The initial pilot program will address one and two family homes, and in 2010 a solar pilot is planned for multi-family homes which will address cost barriers such as split incentives.

The aforementioned partnership allows all parties contributing to leverage each others' contributions to maximum effect for dollar invested in the program. The target of funding 50% of an average hot water system is among the most generous available anywhere in the world and similar levels of incentives have proved successful in creating broad based market demand for solar energy in other jurisdictions.

Structure of incentive program (per home):

Typical System Cost	
Average System Cost	\$6,800
Monitoring Cost	\$400
<b>TOTAL COST</b>	<b>\$7,200</b>
Partner Contributions	
COV Contribution	\$1,000
Terasen Contribution	\$1,025
SolarBC Contribution	\$1,375
Offsetters Contribution	\$200
<b>TOTAL CONTRIBUTIONS</b>	<b>\$3,600</b>
Total Cost	\$7,200
Total Contributions	\$3,600
Cost to Homeowner	\$3,600

The proposed program is structured so that SolarBC, who already distributes incentive funding on behalf of the Federal and Provincial Governments to builders and homeowners, will also distribute the funding on behalf of this partnership. Partnering with SolarBC allows the City of Vancouver and Terasen Gas to take advantage of a well-developed and robust granting framework that is easily accessible, has a demonstrated track record serving industry, while protecting consumers and ensuring solar systems are installed correctly and to maximum effect. The proposed contribution structure of the incentive funding is attached in Appendix A of this report.

The incentive will be disbursed directly to home builders who will be able to apply for it by contacting solar BC Directly via phone or website. Funds will be made available to the first 50 applications that meet the criteria of the incentive program, which is that a solar audit has been done and shows the home has potential for solar energy generation, and the builder will use a Solar BC Certified installer to install the system. Any Canadian Standards Association (CSA) approved system is eligible for funding under the program.

The program supports the City of Vancouver's greenhouse gas reduction targets and the Greenest City Action Team's recommended actions around (1) developing a solar pilot, (2)

green jobs (3) reducing green tape and (4) integrated energy systems. Encouraging the proliferation of renewable technologies in Vancouver will help the City move toward its greenhouse gas reduction goals for buildings.

The program will monitor the performance of the systems and the annual energy savings in each home, establishing the viability of the technology in Vancouver's climate and the value of the energy savings for the homeowner. While solar hot water is a proven technology, there is a lack of data on energy savings over time from Vancouver's climate zone. The proposed monitoring program will address this information gap and provide valuable information to inform future green building policy as it relates to solar hot water.

Encouraging uptake of solar hot water technology in Vancouver will also stimulate the economy and create green jobs. The project will offer opportunities for local capacity building, education and training. The larger the market is for solar hot water, the more the local industry will grow and prosper. New jobs can be created in research, manufacturing, distribution, installation and maintenance of solar hot water systems. Ideally, these steps toward encouraging solar will help Vancouver become an industry leader in solar hot water technology and creates a pathway to requiring renewable energy technology in the development of the City's carbon Neutral Building Plan.

The monitoring and research component of the solar hot water pilot program will be conducted in partnership with Terasen Gas. The monitoring will track the energy produced by each system and the annual greenhouse gas reduction data. The City will share this data with Solar BC in order to have it available to the rest of the province. This data will be critical in assessing what Vancouver's solar potential is for future GHG reductions.

#### **Becoming a Solar Community:**

Solar BC has invited Vancouver to join its coalition of Solar Communities that it has formed to promote and study Solar technology in BC (see Appendix B). They have recognized Vancouver already as a leader in the application of solar technology and would like to formalize a relationship through the Solar Communities program. Should council choose to become a Solar Community it will provide the City of Vancouver a platform to share its accomplishments and research with others more broadly with less staff resources. It will also provide the city valuable learning opportunities and some recognition for its accomplishments.

#### **Outreach, Market Development and Education:**

Consultation with industry has revealed that one of the primary barriers to the installation of solar hot water technology is lack of knowledge in industry on jurisdictional permit requirements. The lack of a national standard for solar systems in Canada means that local governments are left to create their own regulatory framework concerning solar hot-water. In order to address this staff have developed an information sheet prepared by the Office of the Chief Building Official and Sustainability Group staff (that outlines the Vancouver Building By-law requirements for solar installation).

To further this communication effort and overcome these perceived barriers, the Sustainability Group is creating a number of outreach, educational and promotional opportunities and materials including a general FAQ (see Appendix C). The purpose of the outreach effort is to raise awareness about the benefits of solar with the consumer and also



to facilitate and simplify the approval process of installing solar in the City of Vancouver. Information materials will be available on both the City of Vancouver's and SolarBC's websites and in hard copy at the Enquiries Centre.

In addition to this, the following details the deliverables of our outreach and communications strategy to encourage solar system installation:

1. Host two solar open houses in January and April 2010, inviting the public, certified solar installers, SolarBC, the Canadian Solar Industries Association (CANSIA), builders and City Permit and Sustainability staff;
2. Provide training to staff in Development Services so they are able to promote the program and answer questions they may receive from applicants;
3. Distribute program marketing materials to building permit applicants; Directly market to high volume new home builders on the benefits of Solar Technology.

### **CONSULTATION PROCESS**

The Sustainability Office in coordination with the Chief Building Officials office engaged in focussed consultation process with the building industry, solar installers, and SolarBC.

The purpose of the consultation process was to first gauge the potential demand of the proposed program, with GVHBA and local Vancouver builders. Staff at the GVHBA and 25 builders surveyed indicated that they would be supportive and make use of such a program.

The second focus of the consultation process was to engage the local membership of the Canadian Solar Industry Association (CANSIA) registered installers to a meeting to discuss how to develop a program with best opportunity for success. The feedback from the installers representing six local distributors and installers was critical in forming the recommendations in this report.

Staff have also research national and international solar incentive and out-reach programs in Ottawa, Portland Oregon, California, Germany, and Spain order to ensure that Vancouver was offering as comprehensive as program as possible.

### **FINANCIAL IMPLICATIONS**

The City of Vancouver is committing \$50,000 in funds toward the incentive program and program delivery from the 2009 Sustainability budget. These funds originated from unallocated recoveries attained from a grant from Natural Resources Canada with the intention that the funds would be used for reducing GHG's in Vancouver. While unallocated the application of these monies to leverage even larger amounts of capital to develop, study, and support renewable energy projects ensures that the funds are being applied in the spirit they were intended.

**ENVIRONMENTAL IMPLICATIONS**

Water heating accounts for 25-30 per cent of residential energy use and, in Vancouver's climate, solar hot water systems can provide up to 60 per cent of the energy required for water heating. Using solar energy to supply the majority of energy for domestic hot water can deliver significant GHG savings. A home with a solar hot water installation can eliminate up to two tonnes of GHG emissions annually, according to SolarBC. As stated above one of the outcomes of this project will be to ascertain certainty of that estimate and provide council with better data on what The City of Vancouver's potential is with regards to reducing GHG's via the application of Solar technology.

**CONCLUSION**

Staff recognize that the development and installation of on-site renewable energy is critical towards achieving the council adopted target of carbon neutral new construction. The application of solar hot water systems in a residential context presents the best market ready opportunity to realize on-site renewable energy generation on broad scale.

By joining the Solar Communities network, and working with SolarBC Vancouver will be able to share its learning's with other jurisdictions in order to support the larger scale changes required at provincial and national level to mitigate climate change and reduce dependency on fossil fuels. Becoming a Solar community will also help to establish Vancouver as a national leader in application of solar technology.

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Funding Structure Table

Partner Contributions					
	COV	Terasen	SolarBC	Offsetters	TOTAL
Monitoring		\$20,000			\$20,000
Solar Unit	\$50,000	\$31,250	\$68,750	\$10,000	\$160,000
TOTAL	\$50,000	\$51,250	\$68,750	\$10,000	\$180,000



Solar Communities Letter



Tap Into The Sun

SolarBC Makes It Easy For People To Install Solar Hot Water

85-4317 Glenford Avenue  
Victoria, B.C. V8Z 4B9  
Tel: 250-590-6370  
nharris@solarbc.ca

November 4, 2009

David Ramsle, MSc LEED  
Manager, Sustainable Development Program  
City of Vancouver  
453 West 12th Avenue,  
Vancouver, BC V5Y 1V4

Dear Mr. Ramsle,

RE: SolarBC Solar Communities

I am very pleased to inform you that the SolarBC Oversight Committee has given approval to have the City of Vancouver named as a Solar Community.

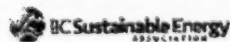
The Oversight Committee recognizes the leadership that the City has undertaken in the solar hot water realm by the implementation of the solar ready mandate and the development of solar demonstration projects.

We would be interested in presenting the Solar Community Certificate at a Council meeting if you think that would be appropriate.

We welcome the City into our Solar Communities program and look forward to working in partnership with the City towards demonstrating the potential for solar hot water throughout British Columbia.

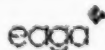
Sincerely,  
Nitya C. Harris, P.Eng.  
Executive Director  
SolarBC

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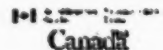
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## APPENDIX - C

### Frequently Asked Questions

#### What are the benefits of solar hot water systems?

Solar hot water systems use the sun's energy to heat water for domestic use. Tapping into this free, abundant natural resource reduces reliance on fossil fuel sources such as natural gas or electricity. Installing a solar hot water system will reduce the cost of your hot water heating bill. You will also be directly reducing greenhouse gas emissions thereby contributing to a healthier environment.

#### How effective are solar hot water systems?

On average, 25-30% of a home's energy is devoted to water heating. Solar hot water systems in Vancouver can supply 60% of energy needs for water heating. Over the course of the year, this adds up to significant savings.

#### Does this technology work in Vancouver's climate?

Modern solar water heaters are well suited for the Canadian climate because they have the ability to produce energy when the outside temperature is well below freezing. They also have mechanisms that protect them from freezing in the winter and from overheating on hot sunny days.

#### Is this technology reliable? Will we always have hot water?

Yes it is reliable, but, since the solar system will not always supply 100% of daily demand, it is necessary to install a conventional hot water heating system as a back-up in order to ensure hot water supply at all times.

#### Will my home be suitable?

A typical system requires up to six square meters of roof space for collectors, and a sloped, south-facing collector orientation is ideal for installation with minimal shading from nearby trees and buildings.

A free survey of the site and orientation of your home is available on line at <http://www.solarrating.ca/>. This simple, free service will help determine whether your building site and design are suitable for a solar hot water installation.

#### What does a solar hot water system consist of?

In general, solar hot water systems consist of three main components:

1. Solar collector, which converts solar radiation into useable heat.
2. Heat exchanger/pump module, which transfers the heat from the solar collector into the potable water.
3. Storage tank to store the solar heated water.

**How does it work?**

Solar hot water systems convert sunlight into heat through solar collectors mounted on the roof. Water, or a water/antifreeze solution, carries heat from the collectors and pumps it through a heat exchanger to a tank for storage and subsequent use.

The storage tank acts as a pre-heat tank for the existing hot water tank. As hot water is being drawn from the existing tank, hot water from the pre-heat tank replaces it.

**Does it make economic sense?**

Over its lifetime, a solar hot water system easily pays for itself and further provides proofing against a trend of rising energy costs. According to the British Columbia Utility Commission, natural gas prices have increased an average of 12% per year since 1998. With gas prices on the rise, using a solar hot water system will save you even more in the future.

**What is the average payback for a solar thermal system?**

Solar hot water systems can save the home owner or business a substantial amount of money and reduce GHG emissions. At current energy prices, these systems can pay for themselves in 5-15 years, depending on the application. If fuel prices continue to rise, the payback time reduces.

**How long will it take to install a solar system?**

On average, 2-3 days are required to install a solar system.

**What is the life expectancy of a solar system?**

The life expectancy of a solar system is between 20 and 30 years. If a solar system receives regular annual maintenance checks, they can last over 30 years. It is recommended that a service contract be made with your qualified solar installer.

**How much maintenance and service is required?**

Solar systems should receive an annual service check so that they can function at their optimum level. Check with your service contractor.

Evacuated tube technology requires virtually no regular maintenance of the system. If a tube is broken, the system can remain operational, only the efficiency of the system will be reduced slightly.

**Will a solar hot water heating system work on a cloudy day?**

Yes. Although the heat output of the solar collector is reduced on overcast days it will still be able to provide heating. Approximately 25-30% of the sun's energy actually gets through the clouds.

**What about adding the Solar Hot Water Heater into the mortgage?**

This is a great time to install a solar hot water system. The monthly savings are far greater than the small increase in mortgage payments. And, the tax savings from the home mortgage

or home improvement loan -- typically 25% or more -- count as an itemized deduction on your income tax. Typically, the after-tax rate of return on investment will be over 18% per year, even for two people. You also increase the property value of your home and its visual perception as an energy efficient, environmentally responsible home.

**What about the appearance of a Solar Collector on our roof?**

Solar collectors are typically integrated into the slope of the roof. This method of installation gives the solar collector the appearance of a quality, opaque, glass skylight. In most cases, since the piping is not seen, it actually improves the appearance of the home because it looks like an elegant, expensive skylight.